Chapter 9

Geology, Soils, Seismicity, and Groundwater

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INTRODUCTION

The regional geology, soils, seismicity, groundwater, and project area flood control in Sacramento, San Joaquin, and Contra Costa Counties were described in the 1997 DEIR/EIS. Alternative 4, "EBMUD-Only Lower American River Delivery," and Alternative 5, "Sacramento River Delivery," include facilities that are very similar to those discussed for Alternative 3, "Joint Water Supply," in the 1997 DEIR/EIS. The 1997 DEIR/EIS therefore includes a full discussion of the environmental setting for these alternatives. Because Alternative 6, "Freeport East Delivery," Alternative 7, "Freeport South Delivery," and Alternative 8, "Bixler Delivery," include facilities in locations that were not specifically described in the 1997 DEIR/EIS, additional information is provided as appropriate in the "Affected Environment" section below.

AFFECTED ENVIRONMENT

Regional Soils

The pipeline in Alternative 6, "Freeport East Delivery," would be constructed on ground underlain by the Riverbank and Laguna formations. The pipeline in Alternative 7, "Freeport South Delivery," would be constructed on ground underlain by levee and channel deposits and the Modesto formation. The pipeline and facilities for Alternative 8, "Bixler Delivery," would be constructed on ground underlain by alluvial fan deposits. The treated water and brine lines in one treatment option under Alternative 8 would be constructed within the Mokelumne Aqueducts right-of-way, which is underlain by sandstone (San Pablo Group and Markely Sandstone) and alluvium. Where the brine pipeline discharges into Suisun Bay, it crosses intertidal mud deposits (Wagner et al. 1981).

Review of the Natural Resources Conservation Service's Soil Survey Geographic Data Base indicates that about half of the Alternative 6 alignment traverses soils that are highly corrosive to steel. About half of the soils are designated as easily eroded. About a third of the soils along this alignment are designated as having shrink/swell properties, and about a third are designated as having low strength.

Almost all of the soils along the Alternative 7 alignment are designated as corrosive to steel, and over half are designated as easily eroded. About three-quarters of the soils along the Alternative 7 alignment are designated as having shrink/swell properties, and about three-quarters are designated as having low strength.

Soils on the west bank of Indian Slough and at Bixler, which would be affected by Alternatives 7 and 8, are estimated to be subject to liquefaction at a peak ground acceleration of less than 0.1 g (EBMUD 1992).

Regional Seismicity

The regional seismicity for Contra Costa, Sacramento, and San Joaquin Counties is described in the 1997 DEIR/EIS. In the vicinity of Bixler (Alternative 8), the Coast Range-Central Valley blind-thrust fault, thought to lie under the Bixler area, is the main fault that could affect the area. This fault is estimated to have a 500-year event of Richter Magnitude 6.7 (EBMUD 1996a).

Regional Groundwater

Regional groundwater conditions for Contra Costa, Sacramento, and San Joaquin Counties are described in the 1997 DEIR/EIS. In the vicinity of Bixler, groundwater levels are maintained by pumping at about five feet below the surface to allow crop establishment and growth. Groundwater is recharged from the

adjacent Delta rivers and sloughs, irrigation, and rainfall (EBMUD 1996a).

Project Area Flood Control

The proposed sites for the intake structures on the Sacramento River at the Sacramento River WTP (Alternative 5) and Freeport (Alternatives 6 and 7) are within the river channel next to levees that are part of the Sacramento River Flood Control Project.

ENVIRONMENTAL CONSEQUENCES

Methods and Assumptions

The analysis in this REIR/SEIS uses the same methods and assumptions as the 1997 DEIR/EIS.

Significance Criteria

The significance criteria described in the 1997 DEIR/EIS were used to analyze the additional alternatives evaluated in this document. An alternative was considered to have a significant impact if it would cause substantial flooding, erosion, or release of soils into surface waters (siltation); expose people or structures to major geologic hazards; substantially degrade or deplete groundwater resources; interfere substantially with groundwater recharge; remove any unique geologic or physical features; or involve changes in topography that would result in unstable soil conditions.

Impacts Found to Be Less Than Significant

Alternative 4: EBMUD-Only Lower American River Delivery

The facilities associated with Alternative 4 are essentially identical to those in Alternative 3, "Joint Water Supply," as described in the 1997 DEIR/EIS. Therefore, Alternative 4 would have the same impacts as described for Alternative 3:

- Potential for increased flooding from siting of an intake structure.
- Potential for localized erosion, siltation, and unstable soils from construction.
- Potential for facility failure from seismic activity.
- Potential for interference with groundwater recharge after construction.
- Potential for increased flooding during pipeline construction.

As described in the 1997 DEIR/EIS, these impacts are less than significant. No mitigation is required.

Alternative 5: Sacramento River Delivery

The facilities associated with Alternative 5 are essentially identical to those in Alternative 4 except that the intake structure would be located on the Sacramento River rather than the American River. Therefore, Alternative 5 would have the same impacts as listed above for Alternative 4. These impacts are less than significant. No mitigation is required.

Alternative 6: Freeport East Delivery

This alternative would have similar impacts to those described for Alternative 3 in the 1997 DEIR/EIS and listed above for Alternative 4. These impacts are less than significant. No mitigation is required.

Alternative 7: Freeport South Delivery

This alternative would have similar impacts to those described for Alternative 3 in the 1997 DEIR/EIS and listed above for Alternative 4. These impacts are less than significant. No mitigation is required.

Alternative 8: Bixler Delivery

This alternative would have similar impacts to those described for Alternative 3 in the 1997 DEIR/EIS and listed above for Alternative 4. These impacts are less than significant. No mitigation is required.

Significant Impacts and Mitigation Measures

None of the project alternatives would result in significant impacts related to geology, soils, seismicity, and groundwater, and no mitigation measures are required.